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APGA Convention 2023
ILI Validations – What are they good for?

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Introduction - Why put this presentation together?

In my role a advisor I look after a number of sites across Asia and the Pacific.

I've noticed during many of these interactions that the concept and reason behind validations is sometimes (not always) miss understood.

"I've done a dig, the results were pretty close to the tool (within spec) so that means I can rely on the rest of the data for my integrity management"

And maybe for that dataset, we get lucky and the above holds true.

In my experience however this is very rarely the case.

Pipeline Validations - Standards

There are standards with regards to pipeline validations.

1. They are called for in AS 2885.3 Section 6.5.2 In-Line Inspections
2. AS 2885.3 then calls up API Std 1163

The first MFL tools were available in 1964, first UTWM tools were available in 1980's and the first crack tools were available in 1990's.

API 1163 provide guidance to conduct ILI Validation. First API 1163 Standard was available in 2005 with API 1163 (3rd Edition) issued in 2021. Within API 1163 there are 3 levels of assessment.

Pipeline Validations - Standards

Level 1

- A proven process and ILI technology OR anomalies that represent low risk
- Use vendor specification with little or no field validation

Level 2

- Test the vendor specification with field-measured anomalies
- A binomial test – with 3 Outcomes
- reject, maybe get more measurements, do not reject

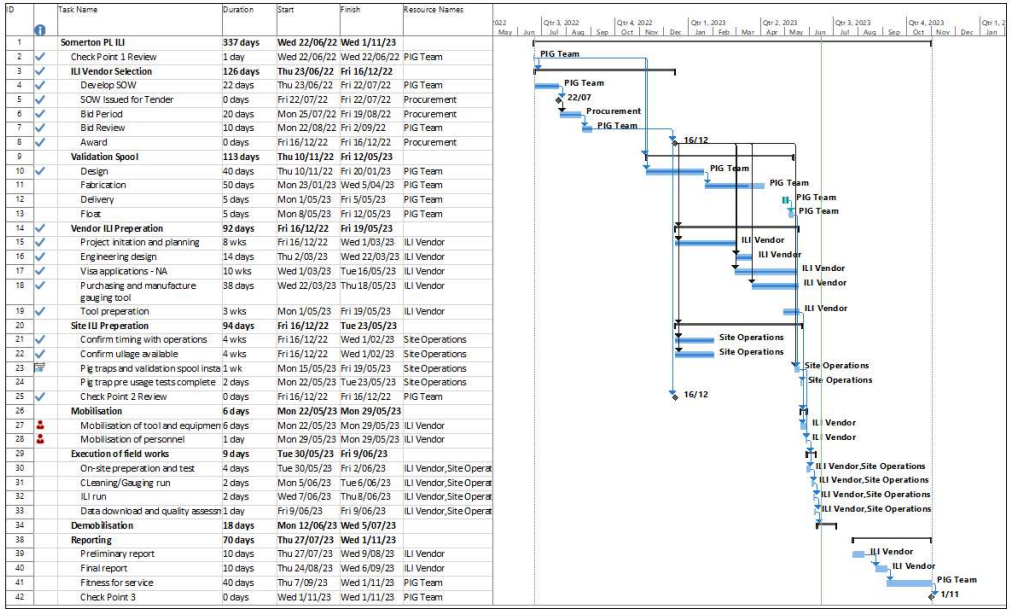
Level 3

- Calculate the as-run performance of the ILI tool
- Use field-measured anomalies or validation spools
- Vendor specification is not used to define performance

Pipeline Inline Inspections – Time and Effort

A lot to time is spent planning for a successful inline inspection

- Understanding the unique threats to the pipeline
- Understanding the best tool or combination of tools to mitigate those threats
- Pigability studies
- Site access requirements
- Supply planning/interruption
- Resourcing
- Contingency planning



ID	Task Name	Duration	Start	Finish	Resource Names
1	**Somerton PL ILI**	**337 days**	**Wed 22/06/22**	**Wed 1/11/23**	
2	Check Point 1 Review	1 day	Wed 22/06/22	Wed 22/06/22	PIG Team
3	**ILI Vendor Selection**	**126 days**	**Thu 23/06/22**	**Fri 16/12/22**	
4	Develop SOW	22 days	Thu 23/06/22	Fri 22/07/22	PIG Team
5	SOW Issued for Tender	0 days	Fri 22/07/22	Fri 22/07/22	Procurement
6	Bid Period	20 days	Mon 25/07/22	Fri 19/08/22	Procurement
7	Bid Review	10 days	Mon 22/08/22	Fri 2/09/22	PIG Team
8	Award	0 days	Fri 16/12/22	Fri 16/12/22	Procurement
9	**Validation Spool**	**113 days**	**Thu 10/11/22**	**Fri 12/05/23**	
10	Design	40 days	Thu 10/11/22	Fri 20/01/23	PIG Team
11	Fabrication	50 days	Mon 23/01/23	Wed 5/04/23	PIG Team
12	Delivery	5 days	Mon 1/05/23	Fri 5/05/23	PIG Team
13	Float	5 days	Mon 8/05/23	Fri 12/05/23	PIG Team
14	**Vendor ILI Preperation**	**92 days**	**Fri 16/12/22**	**Fri 19/05/23**	
15	Project intitation and planning	8 wks	Fri 16/12/22	Wed 1/03/23	ILI Vendor
16	Engineering design	14 days	Thu 2/03/23	Wed 22/03/23	ILI Vendor
17	Visa applications - NA	10 wks	Wed 1/03/23	Tue 16/05/23	ILI Vendor
18	Purchasing and manufacture gauging tool	38 days	Wed 22/03/23	Thu 18/05/23	ILI Vendor
19	Tool preperation	3 wks	Mon 1/05/23	Fri 19/05/23	ILI Vendor
20	**Site ILI Preperation**	**94 days**	**Fri 16/12/22**	**Tue 23/05/23**	
21	Confirm timing with operations	4 wks	Fri 16/12/22	Wed 1/02/23	Site Operations
22	Confirm ullage available	4 wks	Fri 16/12/22	Wed 1/02/23	Site Operations
23	Pig traps and validation spool insta	1 wk	Mon 15/05/23	Fri 19/05/23	Site Operations
24	Pig trap pre usage tests complete	2 days	Mon 22/05/23	Tue 23/05/23	Site Operations
25	Check Point 2 Review	0 days	Fri 16/12/22	Fri 16/12/22	PIG Team
26	**Mobilisation**	**6 days**	**Mon 22/05/23**	**Mon 29/05/23**	
27	Mobilisation of tool and equipmen	6 days	Mon 22/05/23	Mon 29/05/23	ILI Vendor
28	Mobilisation of personnel	1 day	Mon 29/05/23	Mon 29/05/23	ILI Vendor
29	**Execution of field works**	**9 days**	**Tue 30/05/23**	**Fri 9/06/23**	
30	On-site preperation and test	4 days	Tue 30/05/23	Fri 2/06/23	ILI Vendor,Site Operat
31	CLeaning/Gauging run	2 days	Mon 5/06/23	Tue 6/06/23	ILI Vendor,Site Operat
32	ILI run	2 days	Wed 7/06/23	Thu 8/06/23	ILI Vendor,Site Operat
33	Data download and quality assessn	1 day	Fri 9/06/23	Fri 9/06/23	ILI Vendor,Site Operat
34	**Demobilisation**	**18 days**	**Mon 12/06/23**	**Wed 5/07/23**	
38	**Reporting**	**70 days**	**Thu 27/07/23**	**Wed 1/11/23**	
39	Preliminary report	10 days	Thu 27/07/23	Wed 9/08/23	ILI Vendor
40	Final report	10 days	Thu 24/08/23	Wed 6/09/23	ILI Vendor
41	Fitness for service	40 days	Thu 7/09/23	Wed 1/11/23	PIG Team
42	Check Point 3	0 days	Wed 1/11/23	Wed 1/11/23	PIG Team

Typical ILI Program of Works

Pipeline Inline Inspections – Time and Effort

Once all of this is done, comes the easy part – Running the tool.

Now assuming we have a successful run we wait…We wait for the preliminary report…And then we wait longer for the final report…

This could be three even six months after the run depending on the type of tool selected.

Most of the people originally involve have moved on, and typically it is the inspection/integrity engineer left holding the report.

What we do with the report is arguably the most important step. There is little point running the tool unless we analyze the data it provides us with.

Pipeline Validations - Why

Why do we preform pipeline validations?

- To ensure the data received can be used for the purpose of integrity management. Ultimately to create the sizing distribution to be used in probabilistic assessments.

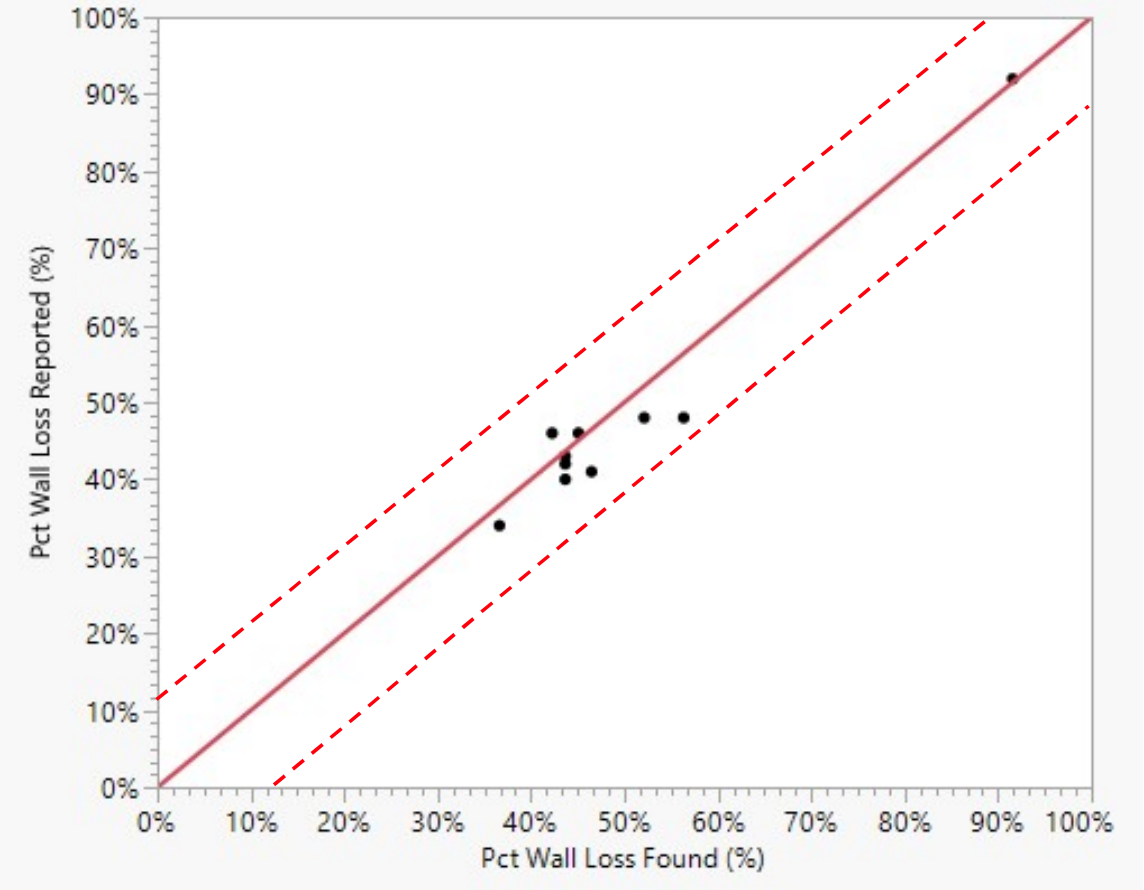
Is it ok to accept the results from the vendor?

“Tools are pretty good now days, much better than last time we did an inspection so why not trust them?”

“What's the worst that could happen if we simply use the vendors tool tolerance”

Pipeline Validations – A Quick Case Study

The below table represents an actual data validation.



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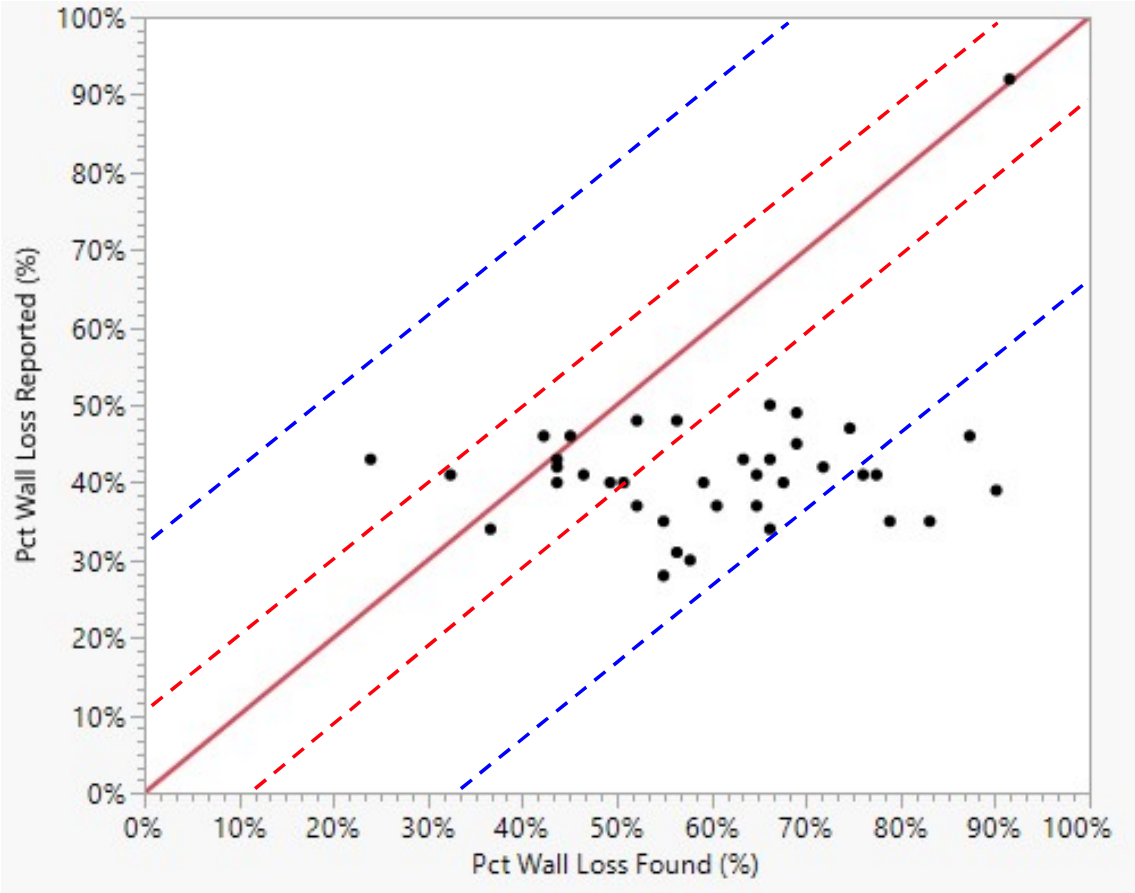

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Pipeline Validations – A Quick Case Study

The below table represents an actual data validation.

	Anomaly 1	
	As Reported	Verified
Depth (%wt)	48%	51%
Depth (mm)	3.4	3.5
Length (mm)	58	225
Width (mm)	170	150

ExxonMobil

Pipeline Validations – A Quick Case Study

The below table represents an actual data validation.

	Anomaly 2	
	As Reported	Verified
Depth (%wt)	47%	74%
Depth (mm)	3.3	5
Length (mm)	32	100
Width (mm)	34	100

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Pipeline Validations – A Quick Case Study

The below table represents an actual data validation.

	Anomaly 3	
	As Reported	Verified
Depth (%wt)	39%	90%
Depth (mm)	2.8	6.5
Length (mm)	44	55
Width (mm)	91	175

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Pipeline Validations – Wrap Up

Now…I asked earlier if it was ok to trust the vendors tool tolerance alone (level 1 assessment)? The answer is that you can, but you will carry some risk.

Based on what we have been through, would you trust the results of a level 2 assessment? Remember the example with 10 x in the field validation results…the answer is that you can, but you will still carry some risk.

Does the effort required to preform a level 3 assessment out way the risk of a leak…Only you the operator can answer this.

So finally…

Inline inspection are an integral part of how we manage the integrity of our pipelines, but they are not the panacea. There is still a need for validation of what the tools are telling us, additional analysis (not covered by this presentation) and as always a degree of engineering judgement to ensure the safe operation of pipeline assets.

Questions?

Thank you


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